Industrial Activities Readiness

Industrial Process Modeling and Optimization

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Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
01 SEP 2004	**N/A**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Industrial Activities Readiness Industrial Process Modeling and Optimization	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **US Army Corps of Engineers Engineer Research and Development Center Champaign, IL 61826**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES
See also ADM001865, Industrial Process and Energy Optimization. Proceedings of the Industry Workshop Held in Gettysburg, PA, 25-27 February 2004., The original document contains color images.

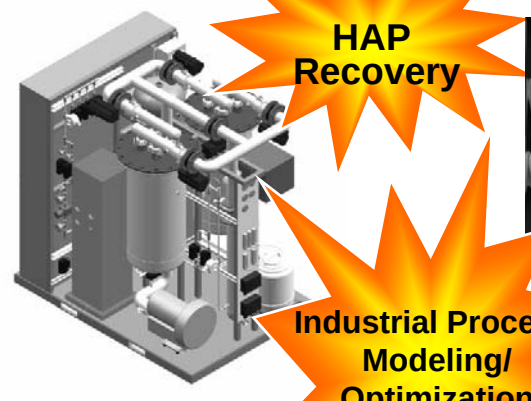
14. ABSTRACT

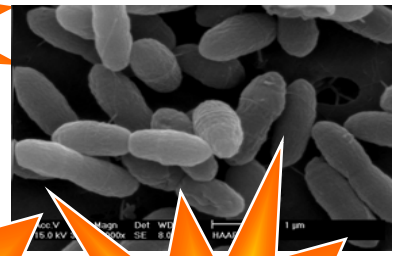
15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**UU**	**12**	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

Industrial Activities Readiness





HAP Recovery

Industrial Process Modeling/ Optimization

Biological Treatment Of Munitions Wastewater

MILESTONES	FY04	FY05	FY06	FY07	FY08	FY09
HAP Recovery Technologies	4		6			
Mass balance models for Army unique processes	2		5			
Perchlorate Removal/ Destruction Mechanisms	1		3			

$5.34M Total Program

Total Army $5.34M	FY04	FY05	FY06	FY07	FY08	FY09
Army	2.90	1.84	0.60	0.0	0.0	0.0
Other						
DUSD						

Work Package Vision Statement

- Maintain mission critical industrial capability by reducing constraints and improving efficiencies in logistics, manufacturing & maintenance

Capabilities/Products

- Technologies to monitor, control and/or recover hazardous air pollutants (HAP) from Army's plating and surface coating operations and combustion sources
- Energy & material balance modeling of industrial processes for optimum efficiency
- Innovative and cost-effective treatment systems to destroy or remove contaminants (perchlorate,TNT, RDX, CL-20, and ONC)

Identify Top Customer(s)

- IMA & AMC
  - •Industrial Installations
  - •Industrial activities on Troop Installations

Recent ERDC-CERL Energy/Environment Projects with AMC

- **Energy**
  - **Process Optimization Assessment**
    - **PBA, WVA, ANAD, TYAD**
  - **Heating System Evaluation**
    - **PICA, ARL**
  - **Low NOx Boiler**
    - **WVA**
  - **Compressed Air System Audit**
    - **APG, CCAD, CEGA, LCAAP, LSAAP, PBA, PICA, RIA, RSA, SIAD, WVA**
  - **PEPR Analysis Program & Process Optimization Guide**

- **Environment**
  - **Hazardous Air Pollutant (HAP) Control**
    - **ANAD, WVA**
  - **Acid Mass Balance & Acidic Wastewater Reduction**
    - **Radford AAP**
  - **Methylene Control**
    - **ANAD**
  - **Convert Oil-based to Water-based Lubricant for Forging Operation**
    - **Scranton AAP**
  - **Pinkwater Treatment**
    - **McAlester AAP**

Problem Statement

- The current Army industrial Base consists of facilities and installations that produce ammunition, store munitions, manufacture components, and maintain and overhaul equipment;
- Many of these facilities and their mechanical and energy systems are beyond their useful life, they were designed without regard to energy conservation and systems reliability;
- Specific feature of many Army industrial facilities is that they are operating at significantly reduced production capacities. However, this is not addressed by production processes layout and energy systems design and operation;
- DoD installations are unable to quantify and control energy consumption at industrial facilities or by their processes;
- Most installation DPW's have insufficient engineering staffing levels, and training/experience to meet energy optimization needs;

Problem Statement (Continued)

- Most of AMC industrial processes are unique and are not addressed by the DOE OIT Industries of the Future Program and R&D efforts;
- Holistic approach to energy optimization in industrial facilities, which includes industrial processes, building envelope and energy/mechanical systems related measures was and is not addressed by any existing program;
- U.S. AMC transformation White Paper authored by General Paul Kern (July 2003), calls for adoption of "Lean Thinking" philosophy at AMC industrial facilities through "improved use of space, reduced process times, waste, and costs, enhanced customer satisfaction, increased efficiency, and saved Army precious resources".

Objectives

- Determine Army requirements and user needs related to industrial facilities;
- Benchmark critical industrial processes for energy consumption and other production costs to support Army transformation strategy, which includes process integration, consolidation and cost reduction;
- Minimize energy loads and optimize operation of building energy systems;
- Develop a suite of tools for DoD industrial base to lower production costs through process and energy optimization, while operating at reduced and full capacity levels;
- Demonstrate these tools through several PO assessments and show-cases at selected installations;
- Train installation energy managers and their contractors in the use of this suite of tools;
- Assist AMC (where needed) in transformation efforts.

Scope of Work and Methodology

- Army needs will be identified through site visits and a joint workshop;
- Consensus process optimization and energy assessment tool will be developed through the thorough analysis of material flows and the overall building/process air and heat balances; processes will be benchmarked to the state-of-the-art with a similar production levels; energy analysis will include such areas as building envelope, process encapsulation systems, HVAC and other mechanical systems;
- Process optimization will be addressed through production consolidation, flexibility and scalability;
- Computer-based tool will provide strategies/measures allowing for reduction/elimination of contaminant emissions inside the building, which include chemical and mechanical approaches; analytical (CFD) and experimental studies will result in templates for optimized designs and performance characteristics of process exhaust systems;

Scope of Work and Methodology (Continued)

- Energy saving strategies will be enhanced through analytical and experimental studies resulting in optimization of ventilation, heating and cooling strategies:
  - Modeling and simulation of mechanical and hybrid ventilation systems for optimal performance;
  - Analytical and experimental studies resulting in development of “enhanced surfaces to be used for critical heat transfer processes and improved energy recovery efficiency;
  - Data mining research to optimize industrial boiler combustion process control;
  - Desiccant research for contaminant removal, humidity control and energy recovery;
  - Tool for scalable system reliability predictive modeling, early fault detection and resilience in system design and maintenance;

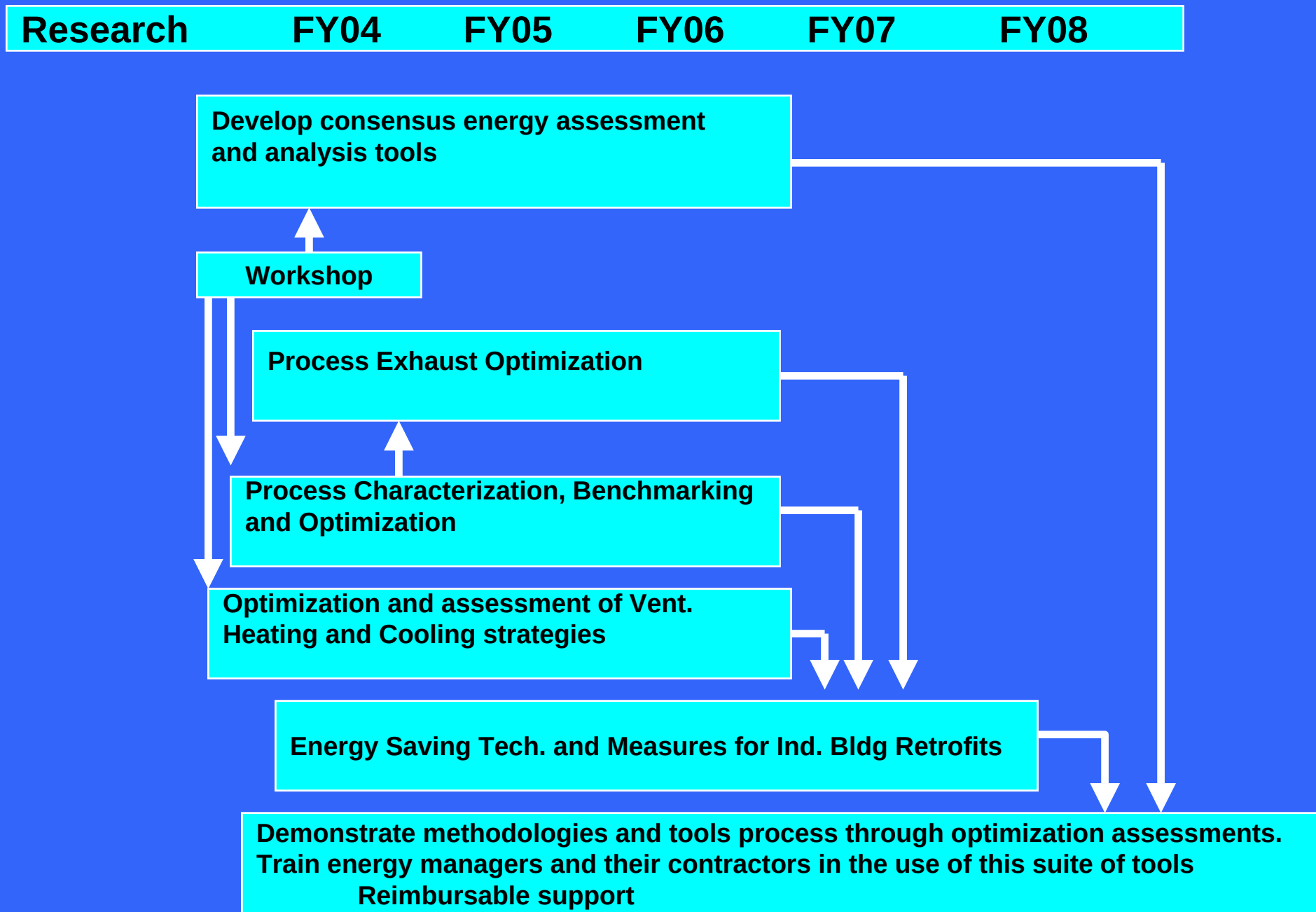
Scope of Work and Methodology (Continued)

- State-of-the-art technologies and energy saving measures screened for applicability and LCCA for representative climatic conditions and energy costs, will provide a data base for the Guide/Adviser “Energy saving technologies and measures for industrial building retrofits”;
- Developed methodologies and tools will be tested and demonstrated through process optimization assessments at selected installations;
- Installation energy managers and their contractors will be trained in the use of the developed suite of tools.

Project Team and Collaboration

- The project will be executed by the USACE ERDC-CERL CFE, CNE and CFM teams using a combination of AT- 45, DO-48 and reimbursable funds in collaboration with DOE OIT, OBT and FEMP Program, ASHRAE and through international collaboration via IEA DSM and ESBCS Programs;
- LBNL and energy assessment centers at UI, Chicago, Texas A&M University – DOE OIT funds?
- Fraunhopher Institute of Building Technologies (Germany) and University of Stuttgart (German national funds via IEA Program)
- VTT (Finnish national funds via IEA Program)
- ASHRAE – technology evaluation TAC
- Consultants from USA and Sweden will participate through reimbursable projects

Timeline


Research
FY04
FY05
FY06
FY07
FY08
Develop consensus energy assessment and analysis tools
Workshop
Process Exhaust Optimization
Process Characterization, Benchmarking and Optimization
Optimization and assessment of Vent. Heating and Cooling strategies
Energy Saving Tech. and Measures for Ind. Bldg Retrofits
Demonstrate methodologies and tools process through optimization assessments.
Train energy managers and their contractors in the use of this suite of tools
Reimbursable support

Summary

- **Requirements Definition Workshop**
  - Act as co-sponsor
  - Identify participants
  - Identify & define research needs
- **Process Optimization Assessment**
  - Provide access to facilities
  - Identify staff for coordination
  - Financial support for technology applications
- **Optimization Tool Development**
  - Support requirements definition
  - Provide technical review & feedback
  - Identify applications for optimization tool
- **Show-case Study**
  - Identify & help select candidate test cases
  - Identify & support technical transfer
  - Define financing pathways